CDM

RAC2
EPA Region 2

Final Data Management Plan

Old Roosevelt Field Contaminated
Groundwater Area Site
Garden City, New York

EPA Contract No. EP-W-09-002
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FINAL DATA MANAGEMENT PLAN
OLD ROOSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
REMEDIAL ACTION
GARDEN CITY, NEW YORK
Work Assignment No.: 023-RARA-02PE

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Acronyms

amsl	above mean sea level
ASC	analytical services coordinator
atm	atmospheric
btoc	below top of casing
CAD	computer aided design
CDM	CDM Federal Programs Corporation
CLP	Contract Laboratory Program
COC	chain of custody
CY	cubic yards
DBMS	database management system
DC	data coordinator
DESA	Division of Environmental Science and Assessment
DM	data manager
DMP	data management plan
DO	dissolved oxygen
DQO	data quality objective
DV	data validation
EDD	electronic data deliverable
EQuIS	Environmental Quality Information System
EPA	United States Environmental Protection Agency
ESRI	Environmental Systems Research Institute
FASTAC	Field and Analytical Services Teaming Advisory Committee
Fe	iron
FSDS	field sample data sheet
GIS	geographic information system
GL	GIS lead
GWTF	groundwater treatment facility
IMS	information management solutions
IMSTL	information management solutions task leader
ITP	Initial Testing Program
LOE	level of effort
Mn	manganese
MS	Microsoft
N/A	not applicable
NAD	North American Datum
NGVD	National Geodetic Vertical Datum
NYSDEC	New York State Department of Environmental Conservation
ODBC	open database connectivity
O&M	operation and maintenance
ORP	oxidation reduction potential
PARCC	precision, accuracy, representativeness, completeness, and comparability
PC	project chemist
PE	project engineer
PG	project geologist
PID	photo-ionization detector

SM	site manager
RAC	remedial action contract
ROD	record of decision
RAS	RA Subcontractor
QA	quality assurance
QC	quality control
RA	remedial action
SAS	Specific Analytical Services
SPDES	State Pollutant Discharge Elimination System
SQL	structured query language
TAL	target analyte list
TBD	to be determined
TCL	target compound list
TSS	total suspended solids
UFP-QAPP	Uniform Federal Policy - Quality Assurance Project Plan
VOC	volatile organic compound

Section 1
Introduction

This Data Management Plan (DMP) was prepared by CDM Federal Programs Corporation (CDM) for the U.S. Environmental Protection Agency (EPA) under the Remedial Action Contract (RAC 2) program, Work Assignment 023-RARA-02PE for the Remedial Action (RA) at the Old Roosevelt Field Contaminated Groundwater Area Site (the Site) in Garden City, New York. The plan is intended to partially fulfill the requirements specified under Task 5.3.4 of the *Final Remedial Action Work Plan* for this work assignment.

The EPA September 2007 Record of Decision (ROD) remedy for the site addresses the site groundwater contamination in the mall area by selecting groundwater extraction and ex-situ treatment technologies. This DMP summarizes CDM's proposed data management protocol supporting remediation of chlorinated volatile organic compound (VOC) groundwater contamination at the Site, which will be achieved through the construction and operation of a groundwater extraction and treatment system. The data management scope of work will be implemented by CDM's information management solutions (IMS) group in conjunction with other members of the project team.

The DMP is broadly applicable to the management and dissemination of data generated during the RA at the Site. During the RA, CDM and its RA subcontractor will collect a variety of environmental, and operations and maintenance (O&M) data that will support site remediation testing, treatment, operations, assessment, reporting, and presentation of RA results to the EPA and other regulatory agencies. Each step in the data management process (data collection, storage, analysis, and reporting) will be adequately planned, executed, and documented in accordance with this DMP to meet quality assurance/quality control (QA/QC) requirements and provide a complete audit trail of the information. This DMP should be referenced in conjunction with the project Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP), for comprehensive sampling methods and procedures, and quality assurance protocols.

CDM will employ an environmental database to manage mission-critical information throughout the remedial action process. The Environmental Quality Information System (EQuIS) created by EarthSoft will be used to manage locational, chemical, operational, temporal, and regulatory data. This product is written in Visual Basic Net and uses the Microsoft (MS) sequel server database engine. CDM has already developed an EQuIS database to manage investigation-phase data. This database will be expanded to store remediation-phase data. The EQuIS database will provide a standard format for data storage and incorporate data checking and reporting. EQuIS will also broadly support the analysis and presentation of remedial action data using MS Access, MS Excel, and geographic information system (GIS) technology.

CDM will also employ a GIS to graphically display, analyze, and present spatial data. Types of data that the GIS will contain include base coverages, such as topographic

and property maps and aerial photos; geographic coverages, such as roads, buildings, topography, and water bodies; and RA-specific information, such as remedial systems locations, sample locations and analytical results, and contaminant iso-concentration contours. The GIS will be supported by the EQuIS database.

Both the database and the GIS will be used, in conjunction with ancillary software, to produce tables, graphs, maps, and figures to support production of RA reports, quarterly remedial progress reports, and technical memorandums.

This DMP addresses data management practices for field and laboratory data collected during RA and first year O&M of the groundwater treatment facility (GWTF).

1.1 Organization of the Data Management Plan

This DMP is composed of the following eight sections:

- Section 1 of this document introduces the DMP and documents the data management scope and objectives.
- Section 2 documents sources of site-specific data.
- Section 3 presents the organizational scheme for CDM's project data management team.
- Section 4 documents the Old Roosevelt Field project data management process, which comprises of project planning, data collection, data validation and qualification, database entry, and data analysis and output.
- Section 5 documents procedures and guidelines pertaining to the site GIS.
- Section 6 documents guidelines for electronic data deliverables (EDDs) and outputs from the data management system and archiving.
- Section 7 documents CDM's guidelines for electronic project documentation and storage.
- Section 8 documents quality control implementation for project data.

1.2 General Data Management Objectives

The objectives of data management for the Site are as follows:

- Standardize and facilitate the collection, formatting, transfer, and maintenance of sample data to the environmental database
- Provide structured data sets that will support project planning and decision-making
- Minimize the uncertainties associated with the data, data-derived products, and interpretation of results through QA/QC defined measures and practices
- Provide accessible engineering and environmental data to support environmental quality characterization and monitoring, report generation, and other needs associated with the RA and O&M.

- Provide data that are adequately documented with descriptive information for technical defensibility and legal admissibility
- Provide analytical results data to the client in EPA Region 2 EDD format

1.3 Project-Specific Data Management Objectives

The project-specific scope of the data management activities addressed by this plan includes, but is not limited to:

- Definition and documentation of the types of data that will be managed
- Documentation of methods used to manage RA and O&M data
- Operation and maintenance of an EQuIS 5 database to organize and store engineering and environmental data to support RA and O&M activities
- Support creation, operation, and maintenance of a GIS for use in data analysis, report preparation, and graphical presentation of the RA, groundwater monitoring and O&M data
- Standardization of EDDs to facilitate data collection, database entry, data query and export functions, and supporting software functionality (GIS, spreadsheet, modeling, etc.)
- Definition of products and deliverables that will be derived from the database, GIS, or supporting software
- Documentation of data management QA/QC requirements
- Documentation of data backup and archiving requirements

1.4 Data Management Plan Objectives

The objectives of this DMP are as follows:

- Define the roles and responsibilities of personnel involved in the management of project data
- Define lines of communication among data managers and project management personnel
- Describe the overall data management process from project planning through data archiving procedures
- Provide requirements and electronic data deliverable formats to streamline data entry from multiple sources including but not limited to laboratory data, surveyor data and field observations
- Provide a standard platform from which data can be retrieved for reporting and analysis

Section 2
Sources of Project Specific Data

This section documents the sources of project-specific data that require data management. The majority of data will be generated through groundwater monitoring and O&M activities conducted by CDM and the RA Subcontractor, respectively. CDM will manage the data, as prescribed in this DMP, and fulfill periodic reporting requirements.

2.1 Data Types

The data that will be generated at the site are described below:

Soil Sampling for Earthwork Construction Activities

- Soil characterization of excavated soils and stripped topsoil prior to re-use onsite: one sample per 100 cubic yards (CY) of soil for full target compound list (TCL) and target analyte list (TAL) metals.
- Soil characterization of imported granular material sampling prior to use onsite: one sample per 5,000 CY of each material type or minimum one sample if quantity is less than 5,000 CY for full TCL and TAL metals.

Well Installation and Testing

- Soil boring logging data collected during installation of the test borings, extraction wells, and monitoring wells
- Grain size data from test boring at the proposed extraction well location
- Field parameters during development of the extraction and monitoring wells: dissolved oxygen (DO), pH, conductivity, temperature, oxidation reduction potential (ORP), turbidity
- Groundwater sampling data (VOCs, total and dissolved iron, and total and dissolved manganese), continuous water level data and field parameters DO, pH, conductivity, temperature, ORP, turbidity during step testing of extraction wells
- Groundwater sampling data (VOCs, total and dissolved TAL metals, total dissolved solids, total suspended solids, nitrate/nitrite, hardness, alkalinity, and oil and grease), continuous water level data and field parameters DO, pH, conductivity, temperature, ORP, turbidity during aquifer testing of extraction wells
- Effluent sampling data (VOCs) during operation of temporary groundwater treatment system for treatment of contaminated groundwater generated during well development, step testing and aquifer testing

Groundwater Treatment System Startup and Operation, Maintenance and Monitoring

Sampling and monitoring requirements for the Initial Testing Program (ITP) and O&M of the GWTF are included in Tables 2-1, and 2-2, respectively. Groundwater

monitoring requirements at the Site during RA are included in Table 2-3. Sampling and monitoring requirements are summarized as follows:

- Baseline and quarterly groundwater monitoring from monitoring wells at the Site including synoptic water level collection, and groundwater sampling with associated field parameters
- Process and compliance sampling during the ITP and O&M of the GWTF
- Air process and compliance sampling and photo-ionization detector (PID) readings during the ITP and O&M of the GWTF
- Continuous water level collection from extraction wells, and synoptic water level measurements from monitoring wells during the ITP and O&M of the GWTF
- Facility operational data (flow rates, pressure, vacuum, temperature, pH, etc.) during the ITP and O&M of the GWTF

Investigation Derived Waste

- Sampling performed as required by the disposal facility

Spatial Data

- Well and sample locations
- Site features including roads, buildings and utilities
- Topography and land features

2.2 Data Collection

Data collected in the field will be entered in spreadsheets in a format that facilitates entry into EQuIS 5. At a minimum, key field information required by the database structure will be recorded on field sample data sheets (FSDS) for entry into the database. Key fields will be obtained from the project Data Manager (DM). Data will be received from analytical laboratories in an EQuIS 4-file format that will facilitate electronic database entry without manual manipulation of the data. The EDD format for the laboratories will be provided by the DM.

2.3 Data Reporting

The database will be used to generate tables that fulfill the reporting requirements and support graphical representation of the data. The project DM will produce a set of standard queries that can be utilized repeatedly to facilitate table and figure generation to support progress reporting. A GIS will be used to depict the spatial relationship between data sets, and produce maps and figures for the reports. Other programs that graph and contour data, will also be utilized. All database, GIS, and technical analysis programs will rely upon effective data management to meet the project objectives. Effective data management will be relied upon to transfer data from CDM's EQuIS Database to the Region 2 EDD format required for reporting data to EPA.

Section 3
IMS Team Organization

This section documents the roles and responsibilities of the IMS team in carrying out their functions and the IMS team flow of communication in interfacing with project and program personnel. CDM and the RA Subcontractor will collect all relevant remedial and operational data for this RA, and as such, they are an important element of the data flow process. Therefore, a coordinated effort between CDM and the RA Subcontractor, to collect and manage the data in accordance with this DMP, will significantly improve the effectiveness of data management.

3.1 Roles and Responsibilities

The CDM IMS team, in conjunction with the RA Subcontractor, will work together to properly execute the data flow process as documented in this DMP, the project UFP-QAPP, and other project plans to ensure that the project objectives and scope are realized. The functional responsibilities of the IMS team are described below. The lines of communication among the IMS data management team are shown in Figure 3-1. The IMS data management team and titles are as follows:

IMS Team Role	Abbreviation	Person/Title
Site Manager	SM	Thomas Mathew, P.E.
Project Engineer	PE	Muzaffar Rahmani
IMS Team Leader	IMSTL	Scott Kirchner
Project Data Manager	DM	Mindy Olsen
Data Coordinator	DC	Grace Chen
RA Subcontractor	RA Subcontractor	TBD
Project Chemist	PC	Jeniffer Oxford
GIS Lead	GL	Kavitha Maddula
Analytical Services Coordinator	ASC	Scott Kirchner
Project Geologist	PG	Frank Robinson

Site Manager (SM) – responsible for overall project management and is the primary contact for the client. The SM assigns appropriate personnel to complete the project tasks and is ultimately responsible for the completion of the project.

Project Engineer (PE)- is responsible for facilitating RA data analysis and preparing client deliverables. The PE interfaces with the CDM field personnel and RA Subcontractor to facilitate RA activities and communication with the IMS team. The PE determines the needs and objectives for an activity and prescribes the database output formats for use in data reporting, graphing, or other technical analyses. The PE is responsible for providing the ASC with sampling event information, so that the ASC can book analytical laboratories through the FASTAC process.

IMS Team Leader (IMSTL) - is responsible for oversight of the data management process. The IMSTL assigns IMS personnel to projects, monitors and balances workload across IMS projects and activities (data coordination, database, GIS), manages resource and schedule conflicts, tracks IMS program deliverables, provides direction and management to the IMS team, and coordinates program-level IMS initiatives and directives. The IMSTL reviews IMS deliverables for proper content and format and tracks project data management budgets and level of effort (LOE) and will alert the PE with any concerns in a timely manner. The IMSTL coordinates with the PE and verifies that all quality control steps are performed. The IMSTL interacts with the DM and data coordinator on all aspects of data management activities, provides guidance and coordination to both during resolution of data inconsistencies. The IMSTL also coordinates the data needs of GIS and technical task leaders. The IMSTL serves as a secondary (to the SM) point of contact for the client regarding IMS issues. The IMSTL also coordinates resource / operations requirements with other IMS leads. The IMSTL maintains the IMS continuous process improvement process and works with IMS resources to make recommendations for process change and improvement. The IMSTL will interface primarily with the PE to determine RA objectives and IMS deliverables. The IMSTL will interact with the DM and the project GIS lead to facilitate IMS task implementation.

IMSTL information needed from the PE for the project includes budget, schedule, and deliverable requirements.

Project Data Manager (DM) - The DM has overall responsibility for the design, operation, and maintenance of the project database. The DM conducts and supervises population of the project database, completes data queries for reports, and conducts database modification efforts. The DM is responsible for the implementation, and evaluation of standard operating procedures to ensure integrity of the enterprise-wide database system. The DM will modify and improve the database tools and structures, as required, to increase performance and efficiency for the entire program. The DM will interface with the PE to confirm sample location and naming consistent with the project UFP-QAPP, format requirements for data uploading RA data, and key field information needed by the DM to maintain referential integrity in the database. The DM will accept direction from the IMSTL on project and program-specific directives.

Information needed by the DM from the PE or project team includes:

- Data management budget, LOE, and schedule information
- Station and sample information

- Reporting requirements and formats to support internal analysis
- Current comparison criteria reference tables including regulatory standards
- Criteria, and action levels, and any site-specific cleanup goals or baseline comparison data

Data Coordinator (DC) - is responsible for the tracking, organization, and formatting of new or existing data generated by field activities or provided by laboratory analyses. The DC also handles laboratory hardcopy deliverables. The DC conducts sample tracking process from the project planning phase through the remedial action and data collection phase of a project. The DC will coordinate with CDM personnel and the RA Subcontractor to conduct effective data tracking during the RA. For samples that are analyzed by the RA Subcontractor's laboratory, the DC will assist the RA Subcontractor in oversight of contracted analytical and data validation services, and ensure that data are complete and consistent. The DC will assist the DM and RA Subcontractor in resolving any data ambiguities, and coordinate with the DM on generation of data reports. The DC will conduct verification activities following receipt of EDDs and participate in QA/QC activities to resolve inconsistencies as necessary.

Information required by the DC from the PE or project team includes:

- A sampling schedule
- EDD formats for site and analytical data
- Deliverable requirements for laboratories
- Sample nomenclature and tracking information from FSDS and chain-of-custodies (COCs)
- EDDs and hardcopy analytical data

Project Chemist (PC) – will perform QC review of all the RA analytical data and provide assistance to the PM, PE, and technical staff in interpreting analytical data. In addition, the PC will be responsible for preparation of data usability assessment reports for baseline and quarterly groundwater samples data. The PC will review the RA Subcontractor's laboratory and data validator's qualifications and standard operating procedures. The PC will assist the PE in communicating with the RA Subcontractor, as needed, and will assist in the in-house checking of the data received from the laboratories.

GIS Lead (GL) - creates and maintains the GIS project. The GL will prepare maps that illustrate geographical features and area characteristics, such as topology, land use, ground cover, roads, buildings, and hydrographs; digitize existing maps; edit and format spatial data, combine it with attribute data from the project database, and prepare topological overlays; and display results through graphic outputs that include maps, color displays, and tabular information. The GL will coordinate database output needs for GIS construction through the DM. The GIS lead will prepare geologic cross sections, chemical iso-concentration maps, water table maps, and well construction diagrams as part of hydrogeological analyses and reporting/presentation. The GL will receive data from the DM and DC in formats

consistent with GIS input requirements. The GL will produce maps and figures to support the PE in data analysis, figure and map production and visual presentation needs.

Information required includes all mapping, computer aided design (CAD), and coverage data needed to produce base layers and media/operation-specific themes, as well as GIS output requirements to support data interpretation and reporting (e.g., list and content of figures/maps required for the project)

Analytical Services Coordinator (ASC) – As described in Section 4.1.2, CDM will comply with the Field and Analytical Services Teaming Advisory Committee (FASTAC) policy for procuring analytical services, which may require samples to be sent to EPA Region 2 Division of Environmental Science and Assessment (DESA), National Analytical Services Contract, or Region Specific Analytical Services (SAS) Contract laboratories. The ASC will be responsible for booking the samples with these laboratories and will be the primary contact for these laboratories. The ASC will obtain the required information regarding the proposed sampling events (number of samples, analyses types, etc.) from the DC or PG. The ASC will be responsible for resolving any analytical discrepancies identified by the project team with these laboratories.

Project Geologist (PG) – The PG will be responsible for coordinating all sampling events to be performed by CDM, sample collection, recording, tracking, and documentation of the field data; and ensuring that the chain-of-custody forms and FSDS are completed in accordance with the project UFP-QAPP.

RA Subcontractor – is responsible for project planning, field operations, and collection of O&M treatment system process data and initial testing plan data. The RA Subcontractor prepares for and conducts sampling activities; collects samples, records, tracks, and documents the field data; and ensures that the chain-of-custody forms and FSDS are completed in accordance with the project UFP-QAPP. The RA Subcontractor ensures that format requirements for data management are followed. The RA Subcontractor compiles and performs QC checks on field data, and interfaces with the PE, PG, and DC as the primary links to the IMS team. The RA Subcontractor is responsible for addressing problems associated with samples analyzed at the Subcontractor's analytical laboratory.

3.2 IMS Team Communications

Frequent communication among CDM project personnel and the RA Subcontractor is the key to successful management of project data. The IMS team communications flowchart, depicted in Figure 3-1, outlines the communication network among IMS team members including the RA Subcontractor. CDM and the RA Subcontractor will conform to the sampling protocols specified in the project UFP-QAPP, including sample naming, collection, location determination, laboratory analysis, and validation. The PE is responsible for monitoring CDM's and the RA Subcontractor's conformance with the project UFP-QAPP. The PE will coordinate with the IMSTL, DM, and DC for support in this endeavor. Internally, data reporting and formatting requirements, and GIS figures and analyses requirements, must be communicated to

the appropriate IMS team members during the project planning phase to ensure that all necessary data and processes are properly planned and executed. The roles and responsibilities presented in this section, and data flow model presented in the next section, will be used as a guide for effective project planning.

Section 4
Project Data Flow Process

This section describes in detail the project data flow processes that will be followed by the project and data management team to capture, assure QA/QC, manage/track and report the data associated with the sampling at the Site. The project data flow process diagram, presented in Figure 4-1, serves as the foundation for data management processes and procedures.

Overall, Figure 4-1 depicts how analytical data, operational data and field data are collected, checked, loaded into the database, and then distributed to end users for various outputs. These output products will be used to document and illustrate the effectiveness of the remedial action at the site and support assessments of long-term monitoring.

4.1 Project Planning and Setup

Project planning and setup is the initial phase of the project data flow process. CDM has prepared the Final Remedial Design, site specific UFP-QAPP, and this DMP document, which establish the sample location and identification nomenclature and the sample custody management procedures. Guidelines for project planning and setup processes are documented below.

4.1.1 Sample Identification Nomenclature

Sample identification must be unique when managed electronically in a database, not only from a task perspective, but also in terms of pre-existing or historical data that are associated with the site or project.

4.1.1.1 Unique Sample Names

The standardized sample identification scheme identified in the project UFP-QAPP will be utilized to identify all samples collected. The sample naming scheme is compatible with the EQuIS 5 database format. The PE will be responsible for checking with the DM to insure that the database can handle the proposed identifiers, and that the analytical laboratories' sample tracking software will not truncate sample identification numbers. If either is the case, the sample identification notation will be adjusted accordingly. CDM and the RA Subcontractor are responsible for assigning QA/QC sample identifiers in a unique manner. QC samples include field blanks, trip blanks, and rinsate blanks. These samples will be associated with a daily matrix sampling event, rather than a specific location. CDM and the RA Subcontractor will be responsible for conforming to the standardized sample naming scheme during all field activities.

4.1.1.2 Field Sample Location Nomenclature

A location name provides a key in a database by which any samples collected from that location can be linked to form a relational database structure. Each sample location or station will be uniquely identified by a numeric or alphanumeric code that will describe the location's attributes. Commonly used attributes that comprise a location name are facility, site type, site number or name, station type, sequential

station number, and possibly an additional qualifier. As with sample IDs, location names are unique and compatible with historical activities at the site.

4.1.2 Analytical Laboratories and Electronic Data Deliverable Format

Under the EPA Region 2 Program, CDM and its subcontractors are required to comply with the FASTAC policy in selecting and implementing all analytical services. This policy requires use of the following tiered decision tree for all non-time critical data collection**:**

Tier 1 – EPA Region 2 DESA Laboratory

Tier 2 - National Analytical Services Contract Laboratory Program (CLP)

Tier 3 - Region SAS Contracts

Tier 4 – Contractor subcontract laboratories

All groundwater samples collected by CDM as part of aquifer testing and groundwater monitoring program will be analyzed by DESA, CLP or SAS laboratories. All samples collected by the RA Subcontractor as part of the initial testing plan and O&M will be analyzed by the RA Subcontractor laboratory. The RA Subcontractor will procure an analytical laboratory, which will conform to the requirements of the project UFP-QAPP.

The laboratory analytical data will be delivered to CDM in the approved EDD format, which must be compatible with the EQuIS 5 data input format and must also incorporate any CDM-specified codes for laboratory method analysis, units, and other fields, as specified by the PE or DM.

The analytical laboratory will produce and deliver a hard copy of the analytical data. The sample information and analytical results in the EDD will be identical to that reported in the hard copy. In accordance with policy, CDM will default to the hard copy when there is any discrepancy between the EDD and hard copy data.

EDDs submitted by the laboratory will be checked by the CDM DM using EQuIS 5 to verify the acceptability of the EDD format. Errors in the data will be relayed back to the respective laboratory for correction.

4.2 Field Remediation Data Collection

Many types of data will be collected as part of the Site activities. These data types are documented in Sections 1 and 2 of this DMP. Analytical data will be received from the laboratories in EQuIS 5 4-file format. FSDS and COC forms are completed in the field and the information therein must be manually entered into the specified EDD format for loading into the database. These data will be tracked from the time of collection until delivery to the DM. Sample tracking and field data entry protocol is addressed below.

4.2.1 Sample Tracking

The data flow process incorporates several tasks associated with data tracking. These events are specifically noted on Figure 4-1 to call attention to these critical phases of data management.

During the project, CDM and the RA Subcontractor will be responsible for conducting effective sample tracking. This process is documented in the project UFP-QAPP. Sample tracking involves the identification of sample nomenclature, the completion of sample labels, filling out COC and FSDS documentation, and tracking samples through the analysis and validation processes. The intent of the tracking process is to ensure that all proposed samples are collected, named properly, located properly, recorded properly on COC forms, analyzed for the proposed analytes, validated correctly, and recorded accurately in the hardcopy and EDD deliverables. The sample tracking process will require CDM and the RA Subcontractor to track samples by sample identification number, sample matrix, date the sample was collected, date the sample was shipped, and a list of the analyses requested. As COCs are returned, CDM and the RA Subcontractor will identify and document the samples and analyses that have been collected to verify that the sampling event is complete. The project UFP-QAPP includes a formal process to conduct checks to ensure integrity of the sampling and data handling processes.

4.2.2 Field Data Entry

Field station location information (station name and location), corresponding sample information (sample identifications, date, time, analyses, depth, QC samples, etc.) and field parameter information, will be recorded by CDM and the RA Subcontractor in field log books, on FSDS and COC forms. It is the Project Geologist responsibility to verify that all pertinent information is recorded. COC forms are used to track samples and to provide sample information to the laboratory. These forms are also sent with samples for evidentiary purposes. In addition, any additional sample information will be recorded in field log books or on information recording forms generated for specific processes. In addition, operational data for the groundwater treatment system will be recorded on facility specific log forms.

CDM PE/PG/DC will ensure that (1) all data needed for reporting are being recorded in the field and (2) the form of data recording best supports subsequent electronic data management. The DC will also conduct a check of the data, and then pass it along to the DM for upload into the EQuIS database. If the information is deemed unacceptable, the DC and DM will coordinate with the PE to rectify discrepancies.

4.2.3 Previous Investigation and Historical Data

Investigation and/or historical data that have been imported into CDM's EQuIS 5 database will be kept with the RA data as they are generated. The PE must insure data do not conflict with previous investigation or historical data, as per location or name, to prevent duplicate data from being generated. The PE will rely upon the DM to assist in the review of the data relative to historical data to maximize consistency.

4.3 Data Validation/Qualification

Data validation for samples analyzed by DESA, CLP, or SAS laboratories will be performed by EPA data validation (DV) personnel in accordance with EPA DV standard operating procedures. For samples analyzed by the RA Subcontractor's laboratory, data validation will be performed by the RA Subcontractor's data validator in accordance with the project UFP-QAPP.

The analytical report narratives, which will be generated by the laboratory, will document details on data quality, data usability, and laboratory non-compliance. The Data Validator will review the analytical report narratives, and prepare a data validation report narrative, which will detail any data quality issues. The data validator will be responsible for ensuring that the laboratory is contacted about any discrepancies or omissions discovered during data validation and is responsible for resolving the issues.

For samples analyzed by DESA, CLP, or SAS laboratories, the data validation reports including Form I's and a revised EDD (EQuIS EFW2LabRES table format) with the following additional fields: result_final, final_qualifiers, validator_name, validation_date , and approval_code will be delivered to CDM for incorporation into the database preceding data output.

The RA Subcontractor's laboratory data packages, including hardcopy analytical records, the EDDs, and the data validation reports, will be delivered to CDM for data management. Data qualifications identified in the data validation reports will be input into the EQUIS database by CDM.

CDM will perform data usability evaluations of validated samples data collected for baseline, quarterly and annual groundwater sampling events. The data usability evaluation will revolve around the project data quality objectives (DQOs) established for the site as enumerated in the project UFP-QAPP. Measurement performance criteria for the data quality indicators (DQIs), precision, accuracy, representativeness, completeness, and comparability (PARCC) will be evaluated against the data validation reports. The data usability evaluation will examine how DQOs were achieved through field operations and the analytical process.

4.4 Database Entry and Post Qualification

CDM will perform data management tasks from this point in the data flow process. The project DM will be the EQuIS data checker who will inspect the EDDs for format and integrity. The DM will communicate the status of the data load back to the DC to resolve any problems. A post-load report will be generated by the DM after the load is complete, and it will be given to the DC to verify that all the data were loaded successfully. Any discrepancies will be resolved through coordination between the DM and DC/PE. If required, discrepancies for samples analyzed by DESA, CLP, and SAS laboratories will be resolved by the ASC, and samples analyzed by the Subcontractor's laboratory will be resolved with the RA Subcontractor. The laboratories will re-submit the EDDs if required.

4.4.1 The Environmental Database

CDM will implement an internal EQuIS Database system to manage data for the Site. Primary tables store project specific locational and analytical data, and look up tables store valid values to provide input to the primary tables. Tables that reference look-up tables can only accept values that have been specified in the look up tables. Data management procedures are a crucial part of the data management system. Established procedures will be followed to ensure consistency among data sets, internal database integrity, and a verified, usable data set. Key field information from the EQuIS database will be used in the additional tables to establish and maintain referential integrity of the database.

The EQuIS front end loading tool set will largely be relied upon to input data into the database due to the sophisticated data entry and checking that the EQuIS tools provide for statistical and reporting purposes. Queries generated in EQuIS will largely be relied upon to extract the data in the format required by the user. Since the database will serve multiple users, each will have queries developed and maintained in the database.

4.5 Data Analysis and Output

Data analysis and output is defined by end uses of the data in the project database. The end uses may comprise GIS, tabular reporting for various purposes, modeling, well diagramming, contaminant contouring, and graphing. An EDD in the EPA Region 2 format will also be a required output**.**

4.6 Data Quality Assurance and Quality Control

The data flow process incorporates several QA/QC checking events, as illustrated in Figure 4-1. These are specifically called out in the data flow process, because of their importance for data accuracy and integrity. QA/QC events will be conducted by CDM and the RA Subcontractor. The PC/PE will be responsible for oversight of the RA Subcontractor and the QA/QC requirements.

CDM will compare planned sample collection with actual samples collected as part of the sample tracking process. CDM will verify that all data for samples collected in the field have been received. CDM will also conduct a QC comparison check of the EDD and hardcopy of sample analytical results as described in Section 8.2 to insure that they match.

The DM will conduct a system validation during the loading process to insure that the database is loading all of the records in the input file. The DC will check the completeness, formatting and correctness of data prior to giving it to DM for database loading. Finally, the DM shall conduct a post-load check of all data in the database for referential integrity and completeness.

QA/QC checks can be completed electronically or manually, depending upon data format. Section 7 provides additional details for documenting QA/QC protocol.

Section 5
Geographic Information Systems

Geospatial data will be collected as part of the Site activities. A GIS will be used to store, analyze, produce, and present the geospatial data. The GIS will be used to support figure and map development for RA reports, quarterly progress reports, and technical memorandums. CDM will utilize ArcGIS, developed by Environmental Systems Research Institute (ESRI), to process the data. The GIS system will be developed to assist the project team with information management by: 1) providing quick access to the sampling locations and results and 2) visually representing the spatial relationships of the sample locations to each other and surrounding features. The system will function as a decision-support and graphical production tool that allows project staff to work with the information in a holistic manner.

Base coverages, such as locational maps, site air photos, and topography, have been obtained during the pre-design investigation at the Site. Property boundaries and infrastructure features, such as buildings, roads, utilities, and site features will be mapped from existing survey data, and will be updated with survey data collected during the RA. All existing wells have been surveyed, and all new wells will be surveyed to provide location data. Measuring point elevations will be obtained to support water table mapping.

The GIS will be used to develop multi-thematic maps and figures that present remediation monitoring sampling locations and results. Sample location data will be used to post well and other sampling point locations. Analytical data derived from the database will be used to post sampling results and develop contour maps and contaminant plume maps. Time-specific, analytical results can be subtracted from previous results to plot contamination concentration difference maps that will be used to track the effectiveness of remediation.

5.1 GIS Mapping Specifications

Data contained in the environmental database will be compatible with GIS spatial data collected as part of the RI and pre-design investigation. A GIS-based mapping system will be developed to facilitate environmental data visualization, mapping, report figure generation, and project tracking.

All mapping and surveying performed during the RA will conform to the following:

Coordinate System	=	New York State Plane
Horizontal Datum	=	North American Datum (NAD) 1983
Vertical Datum	=	National Geodetic Vertical Datum (NGVD) 1988

Survey data will be collected in an electronic format, either from a global positioning system survey conducted by RA Subcontractor personnel or by CD transfer to CDM via the RA Subcontractor's licensed surveyor. The file format for survey information

will be provided to the surveyor by the RA Subcontractor, via the CDM PE, in advance of the survey.

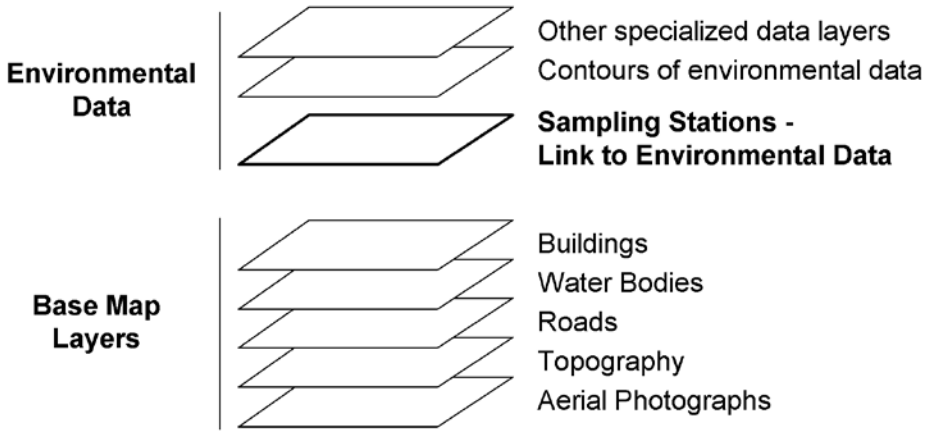
5.2 GIS Map Layers

The GIS will contain two types of map layers:

- Base map data – Any base maps representing facilities and conditions at the Site. These may include, but are not limited to, buildings, roads, water bodies, and aerial photographs. Also included will be themes provided by other outside sources.

- Environmental/Operational data – The primary environmental and operations data layers will contain sampling station locations. Additional data layers may be developed by project staff to support project analysis, decision-making, and recommendations. These may include, but are not limited to, contour maps representing groundwater depths, and chemical concentrations, plume maps representing contaminant concentrations, surface and groundwater flow vector maps, bubble maps showing areas of high analyte concentrations, etc.

The following illustration demonstrates the relationship between the Site GIS map layers:



5.3 GIS Figure Generation

The majority of GIS work will involve figure production to support the preparation of reports, technical memorandums, and technical presentations. Guidelines to facilitate figure production are:

- Each figure layout shall be generated as its own view to facilitate figure revision.
- Each figure shall contain a unique document control designator which identifies the figure by directory, project, and layout name (refer to Section 6 for more details).
- Project figures will always be stored on a server that has a nightly backup.

- Figures will undergo the highest level of quality assurance and control checking. The PE is responsible for checking figures for accuracy and completeness prior to release as a client deliverable. The GIS lead is responsible for tracking and implementing changes requested by the PE.

Figure document control designations shall be placed on all figures. Proper document control nomenclature is essential for efficient and effective document identification, revision, and recovery. An example of an environmental project figure document control designation is:

\\servername\IMS\ GIS \3320-023\figures\rafigures_Y1Q1_VOC.mxd.

This number reflects a figure stored on a server in the IMS GIS directory, in the project directory for an EPA Region 2 work assignment 023 directory, in the figure directory, under the specific figure name and type of information contained in the figure, as an individual .mxd file. In general, a document control number should identify the storage location, project, and figure identification.

5.3.1 Remedial Facilities Construction and Well Diagrams

Drawings and construction diagrams will incorporate data from the database for attribution purposes. When this is the case a request will be submitted to the project DM to produce an electronic data table in a specified format for the software being utilized.

5.3.2 Tabular Reports

Tabular reports of various kinds of data can be produced from the database to support GIS attribution. Requests can be submitted to the project DM who will design and implement the queries necessary to produce the data table. The queries will be saved to a query file to support iteration of the process.

5.3.3 Contaminant Contouring

Contaminant contouring can be conducted in a variety of software programs, depending upon the specific need of the end user. When data to support modeling and contouring are needed a request can be submitted to the project DM to produce a data table in a specified format for the software being utilized.

Section 6
Data Delivery

6.1 EQuIS 5

CDM will submit all sample data collected for this project to EPA in Region 2 EDD format. CDM will approach the creation of this electronic deliverable by pre-populating location and sample information in the EQuIS 4-file format. The laboratories will be required to use the EQuIS 4-file format to report the analytical results.

The EQuIS relational database system can be queried to export results from data tables in the EPA Region 2 EDD format. Data from location, sample, test, and result tables can be converted to create the header, location, sample, result, water level, boring log, and well construction files to be exported into a variety of database formats. Performing queries and writing structured query language (SQL) code within the EQuIS database will provide an efficient and accurate way to transfer all data collected to the client, during and at the end of the data management process.

The EQuIS relational database system will be queried to export sample and location data to other applications such as Excel or GIS for analysis, graphing, and mapping. Data will be securely transferred by the database either as queries from the EQuIS database or as data transferred by an open database connectivity connection (ODBC). ODBC makes it possible to access data from any application, regardless of which database management system (DBMS) is handling the data directly. Geologic data may also be queried out of the EQuIS database into formats as needed for boring logs and visualization.

Section 7
Guidelines for Electronic Project Documentation and Storage

This section contains the guidelines for the Site electronic project documentation. The electronic project documentation shall be in accordance with Section 8 of CDM's QA Manual.

7.1 Document Storage at CDM

A large variety of technical data will be generated during the course of the RA and O&M. A single repository for "master" files will be established on one of the servers on the CDM wide-area network. A master file is an electronic file, such as a spreadsheet, report, database, or GIS project that is commonly updated and distributed to internal or external clientele. As such, the master file, residing on a server, will possess the latest changes and updates. The project staff responsible for generating such documents are responsible for saving the latest versions on the server in a designated single directory or repository. The DM will be responsible for maintaining the EQuIS database master files, and the GIS Lead will be responsible for maintaining the GIS master files. The PE shall be responsible for maintaining all other electronic master files (i.e., project reports) or shall delegate the responsibility as required.

Only the DM/GL and other authorized personnel (personnel proficient in using the software and that are familiar with the project requirements, etc.) will have access to the EQuIS database and GIS project master files. All staff authorized to make changes to the electronic project files by the DM/GL should know where to locate the master files and should always use these files as the most current versions. Copies of these files shall not be distributed to other network or PC locations for purposes other than "read-only" activities. This will assure that all parties know the location of the most current version of the electronic file and avoid modification or electronic transfer of older versions of the file. Outdated copies of files must not be included in an electronic deliverable. Master files will be kept in a centralized location on a CDM server to facilitate systematic backup and security. All project electronic files reside on servers that are automatically backed up on a regular basis.

Section 8
Quality Control Implementation for Project Data

This section is intended to provide those authoring and formatting electronic deliverables guidelines to identify and address QC issues related to the use and transfer of electronic deliverables and project files. To provide high-quality electronic deliverables, the following guidelines should be followed during initiation of the task, during deliverable creation, and upon transfer of the deliverable.

8.1 Standard QC Measures for Electronically Generated Documents

Numerous QC measures will be implemented electronically. The EQuIS database and GIS applications allow construction of constraints and triggers intended to restrict data inserts and updates. Constraints such as enforced relationships between related tables, collections of valid values or value ranges for a given field, and non-null requirement for selected fields will be used whenever possible to ensure data consistency and completeness. Triggers will be used to automatically update fields based on entries in another table or field, automatically format an entry for consistency, open additional data entry forms if certain requirements are met, and a host of other utilities. By embedding these types of QC checks directly in the database or GIS application, QC checks are automated, thereby reducing the potential that the DM will overlook database QC issues.

Additional QC measures for the EQuIS database and GIS electronic files are included in Sections 8.2 and 8.3, respectively.

8.2 Specific Guidelines Related to Electronic Deliverables Generated with Relational Database Software

The DM with assistance from the PE and DC will be responsible for following guidance such as project plans that document specifications, formats, content, and schedules for database development, primarily this Data Management Plan. The procedures shall be as follows:

1. Include data constraints and triggers in database design where possible.

2. Implement auto-update and cascade delete mechanisms where appropriate to avoid mis-matched and orphaned records.

3. Include peer-review of complex queries or modules and output.

4. Limit access to "master" database files and electronic deliverable files.

5. Metadata for each database should be maintained in an appropriate metadata directory. Metadata for databases should include table relationship information and a data dictionary.

6. For all data and database transfers to clients, include the disclaimer, "user is responsible for being familiar with data and intended use." Maintain exact replica of transfer (archive), either on network drive or CD-ROM, for data transfer records.

7. Always document database maintenance tasks including (but not limited to):

   - data structure modifications
   - data loading, modification, and deletion events
   - data transfer events (e.g. to client, team firms, other agencies, subcontractors)
   - major or complex query building and form or report creation for specific investigations or tasks

8. Always include a footer with the individual file name, and the date on reports and forms.

9. Always implement checks for data completeness and accuracy. Checks for completeness include the following:

   - Check that all samples identified in historic data transfers are included in the final electronic data transferred to CDM.
   - Check that all sample results requested on the chain of custody are included in the EDD.
   - Check that duplicate records do not exist in historical data or in laboratory EDDs.
   - Check for completeness of the analyte list.

   Checks for accuracy include the following:

   - Electronic source data (e.g. laboratory EDD, COC or field form data transferred electronically rather than from hard-copy forms) should be checked against official hard-copy document (e.g. hard-copy laboratory report) for at least 10 percent of the data records.
   - For hard-copy source data (e.g. COC, field sample tracking form, laboratory report not accompanied by EDD) a 100 percent verification of hand-entered data should be conducted.
   - Data queries and transfers (particularly data exported to non-native database format) should be checked against database tables (at least 10 percent). Alternate queries should be utilized to verify initial query results.

10. Identify corrective action if problems are identified in checks for completeness or accuracy. Problems must be traced back to the source document. If problems are identified in the source document, the provider of the source document should be notified and required to provide a corrected source document.

8.3 Specific Guidelines Related to Electronic Deliverables Generated with Geographic Information System Software

The GIS Lead will be responsible for following guidance, such as project plans that document specifications, formats, content, and schedules for GIS development. This DMP documents the required data structures, documentation procedures, individual responsibilities, and other issues. The majority of GIS work will involve figure production to support the preparation of reports, technical memorandums, and technical presentations. The procedures shall be as follows:

1. Drawings, maps, and sketches (including text) will be checked by a person other than the preparer. Questions or corrections will be clearly noted and discussed with the preparer of the work product.

2. Include metadata with individual coverages and shape files. Metadata shall be stored in a specific directory (refer to standard IMS directory structure for environmental and natural resource management projects). Metadata should include coordinate system or projection for coverages or shape files. Source documents should be identified and tracked through documentation of metadata.

3. Data that are transferred to a client shall contain the disclaimer "user is responsible for being familiar with data and intended use." Maintain exact replica of transfer (archive), either on network drive, CD-ROM, or other suitable electronic medium for data transfer records.

4. Limit access to "master" database files and electronic deliverable files when possible through password protection or read only status.

5. Always implement checks for data completeness and accuracy prior to release of a product to a client. Checks for completeness include the following:

   - Attributed map objects should have unique attribution.
   - All sample location names should link to a record in the relational database, if appropriate.
   - Duplicate records should not exist.

   Checks for accuracy include the following:

- Features from different sources should overlay correctly (e.g., do streams fall at the bottom of valleys represented by topographic contours); check coordinate or projections between feature coverages or files.
- Hard-copy source data (e.g. COC, field sample tracking form, laboratory report not accompanied by EDD) - should receive a 100 percent verification of hand-entered data.
- Data queries and transfers (particularly data exported to non-native database format) should be checked against database tables at least 10 percent.

6. Peer review of complex designs, programming code, and output should be completed.

7. For printed GIS map files, always include the full pathname and layout name in the figure header or footer.

8.4 QA/QC Measures Implemented Manually

Manual QA/QC checks include visual checks for completeness and checks for accuracy against source document/data such as electronic source data (e.g. laboratory EDD) hard-copy source data. These QC measures are especially pertinent to dealing with data and final review of deliverable products. Specific manual QA/QC procedures will be implemented as prescribed in this DMP.

Tables

TABLE 2-1
Initial Testing Program (ITP) Sampling and Monitoring Schedule
Old Roosevelt Field Contaminated Groundwater Area Site
Garden City, New York

ACTIVITY	LOCATIONS	PARAMETERS[5]	FREQUENCY
14-day Operational Test:			
Step-1, individual well testing [1]			
Water level measurements	Extraction wells and monitoring wells[2]	Water levels	Using data logger
Influent sampling	Influent sample ports	VOC, Total Iron	1 per day (min)
Influent monitoring	Influent sample ports	Water quality parameters[3]	1 per day (min)
	Flow and pressure indicators	Flow, pressure	1 per day (min)
Process sampling	After equalization tank	VOCs, Total Iron	1 per day (min)
	Effluent sample port	Per NYSDEC SPDES permit equivalent requirements [4]	1 per day (min)
Process monitoring	pH indicating transmitter in equalization tank	pH	continuous
	After equalization tank	Water quality parameters[3]	1 per day (min)
	pH indicating transmitter on effluent line	pH	continuous
	Flow and pressure indicators	Flow, pressure	1 per day (min)
Offgas system sampling	Sample port on air stripper offgas effluent line	VOCs via TO-14	1 per day (min)
Optional Testing			
Process sampling	After greensand filtration system, effluent line	Total iron	1 per day (min)
Process monitoring	Flow and pressure indicators on greensand filtration system	Flow, pressure	1 per day (min)
	After greensand filtration system, effluent line	Chlorine	continuous
Step-2, all three extraction wells in operation			
Water level measurements	Monitoring wells[2]	Water levels	Using data logger
Influent sampling	Influent sample ports	VOC, Total Iron	1 per day (min)
Influent monitoring	Influent sample ports	Water quality parameters[3]	1 per day (min)
	Flow and pressure indicators	Flow, pressure	1 per day (min)
Process sampling	After equalization tank	VOCs, Total Iron	1 per day (min)
	Effluent sample port	Per NYSDEC SPDES permit equivalent requirements [4]	1 per day (min)
Process monitoring	pH indicating transmitter in equalization tank	pH	continuous
	After equalization tank	Water quality parameters[3]	1 per day (min)
	pH indicating transmitter on effluent line	pH	continuous
	Flow and pressure indicators	Flow, pressure	1 per day (min)

TABLE 2-1
Initial Testing Program (ITP) Sampling and Monitoring Schedule
Old Roosevelt Field Contaminated Groundwater Area Site
Garden City, New York

ACTIVITY	LOCATIONS	PARAMETERS[5]	FREQUENCY
Offgas system sampling	Sample port on air stripper offgas effluent line to roof stack	VOCs via TO-14	1 per week (min)
Offgas system monitoring	The offgas effluent pipe port	VOCs via PID	1 per day (min)
Optional Testing			
Optional process sampling	After greensand filtration system	Total iron	1 per day (min)
	Supernantant in sludge settling tank before being circulated to equalization tank	Total iron	1 per day (min)
	Sludge sample port on the sludge effluent line at the bottom of sludge settling tank	TSS	4 during pumping cycle (min) [6]
Optional process monitoring	Flow and pressure indicators	Flow, pressure	1 per day (min)
	After greensand filtration system, effluent line	Chlorine	continuous
Disposal sampling	Sludge holding tank	As required by disposal facility	disposal facility
48-hour Operational Test Same as step-2 under 14-day operational test			

NOTES:

1. Groundwater extraction wells EW-1S, EW-1I, and EW-1D are tested individually at design capacity. Each test will be conducted at a minimum of one day.
2. Well list: GWX-10019, GWX-10020, MW-01(S,I), SVP-10
3. Monitoring parameters: dissolved oxygen, pH, conductivity, temperature, oxidation-reduction potential.
4. As per NYSDEC SPDES permit equivalent requirements.
5. Sample analysis should be conducted in accordance with specification 01451-CHEMICAL DATA QUALITY CONTROL.

6. During the pumping cycle, the sludge at the bottom of the sludge settling tank will be pumped into the sludge holding tank. The RA Subcontractor will collected sludge samples at the beginning and during operation and test for TSS in order to evalutate the quantity of sludge generated duirng each backwash cycle.

min - minimum
NYSDEC - New York State Department of Environmental Conservation
SPDES - State Pollutant Discharge Elimination System
PID - photo-ionization detector
VOCs - volatile organic compounds

TABLE 2-2
GWTF Compliance and Performance Monitoring Schedule
Old Roosevelt Field Contaminated Groundwater Area Site
Garden City, New York

ACTIVITY	LOCATIONS	PARAMETERS[3]	FREQUENCY
Water level measurements	Extraction wells and monitoring wells[4]	Water levels	Using data logger
Influent monitoring	Influent sample ports	Water quality parameters[1]	Weekly (min)
	Flow and pressure indicators	Flow, pressure	Weekly (min)
Process sampling	After equalization tank, effluent sample port	VOCs, Total Iron	Monthly (min)
Process monitoring	After equalization tank	Water quality parameters[1]	Weekly (min)
	pH indicating transmitter in equalization tank	pH	Continueous
	pH indicating transmitter on effluent line	pH	Continueous
	Flow and pressure indicators	Flow, pressure	Weekly (min)
Effluent compliance sampling	Effluent sample port	Refer to Note 2	Refer to Note 2
Offgas system sampling	Sample port on air stripper offgas effluent line to roof stack	VOCs via TO-14	Weekly for months 0-6; biweekly for months 6-12
Offgas system monitoring	The offgas effluent pipe port	VOCs via PID	Weekly (min)
Optional Iron Removal System			
Optional process sampling	After greensand filtration system	Total iron	Monthly (min)
	Supernantant in sludge settling tank before being circulated to equalization tank	Total iron	Monthly (min)
Optional process monitoring	Flow and pressure indicators	Flow, pressure	Weekly (min)
	Chlorine analyzer on effluent line of greensand filters	Chlorine	Continueous
Disposal sampling	Sludge holding tank	As required by disposal facility	As required by disposal facility

NOTES:

1. Monitoring parameters: dissolved oxygen, pH, conductivity, temperature, oxidation-reduction potential.
2. As per NYSDEC SPDES permit equivalent requirements.
3. Sample analysis should be conducted in accordance with specification 01451-CHEMICAL DATA QUALITY CONTROL.
4. Well list: EW-01, EW-02, EW-03, GWX-10019, GWX-10020, MW-01(S,I), MW-02(S,I), MW-03(S,I),

GWTF - groundwater treatment facility
NYSDEC - New York State Department of Environmental Conservation
SPDES - State Pollutant Discharge Elimination System
min - minimum
PID - photo-ionization detector
VOCs - volatile organic compounds

Table 2-3
Groundwater Monitoring Program
Old Roosevelt Field Contaminated Groundwater Area Site
Garden City, New York

Well Type	Well ID	Port	Ground Surface Elevation (feet amsl)	Sample Port Depth (feet BTOC)	Port Elevation (feet amsl)	Quarterly Monitoring (Q1,Q2,Q3) For VOCs	Quarterly Monitoring For Fe &Mn	Annual Monitoring (Baseline & Annual) For VOCs	Synoptic Water Level Quarterly	Synoptic Water Level Continuous
Multiport Well	SVP-2	1	88.39	450	-361.61			X	X	
		2	88.39	413	-324.61			X	X	
		3	88.39	373	-284.61			X	X	
		4	88.39	333	-244.61			X	X	
		5	88.39	293	-204.61			X	X	
		6	88.39	253	-164.61			X	X	
		7	88.39	193	-104.61			X	X	
		8	88.39	153	-64.61			X	X	
		9	88.39	103	-14.61			X	X	
		10	88.39	53	35.39				X	
Multiport Well	SVP-3	1	87.17	450	-362.83				X	
		2	87.17	393	-305.83			X	X	
		3	87.17	373	-285.83			X	X	
		4	87.17	293	-205.83			X	X	
		5	87.17	173	-85.83			X	X	
		6	87.17	103	-15.83				X	
		7	87.17	53	34.17				X	
Multiport Well	SVP-4	1	88.85	420	-331.15			X	X	
		2	88.85	400	-311.15	X	X	X	X	
		3	88.85	353	-264.15	X		X	X	
		4	88.85	308	-219.15	X	X	X	X	
		5	88.85	288	-199.15	X		X	X	
		6	88.85	248	-159.15	X		X	X	
		7	88.85	188	-99.15	X	X	X	X	
		8	88.85	148	-59.15			X	X	
		9	88.85	103	-14.15			X	X	
		10	88.85	48	40.85				X	
Multiport Well	SVP-5	1	85.55	430	-344.45			X	X	
		2	85.55	408	-322.45	X	X	X	X	
		3	85.55	358	-272.45			X	X	
		4	85.55	313	-227.45	X	X	X	X	
		5	85.55	293	-207.45			X	X	
		6	85.55	253	-167.45			X	X	
		7	85.55	193	-107.45	X	X	X	X	
		8	85.55	153	-67.45			X	X	
		9	85.55	98	-12.45			X	X	
		10	85.55	48	37.55				X	
Multiport Well	SVP-9	1	90.27	482	-391.73			X	X	
		2	90.27	402	-311.73			X	X	
		3	90.27	352	-261.73			X	X	
		4	90.27	307	-216.73			X	X	
		5	90.27	287	-196.73			X	X	
		6	90.27	247	-156.73			X	X	
		7	90.27	187	-96.73			X	X	
		8	90.27	147	-56.73			X	X	
		9	90.27	102	-11.73			X	X	
		10	90.27	47	43.27				X	

Table 2-3
Groundwater Monitoring Program
Old Roosevelt Field Contaminated Groundwater Area Site
Garden City, New York

Well Type	Well ID	Port	Ground Surface Elevation (feet amsl)	Sample Port Depth (feet BTOC)	Port Elevation (feet amsl)	Quarterly Monitoring (Q1,Q2,Q3) For VOCs	Quarterly Monitoring For Fe &Mn	Annual Monitoring (Baseline & Annual) For VOCs	Synoptic Water Level Quarterly	Synoptic Water Level Continuous
Multiport Well	SVP-10	1	87.83	482	-394.17	X		X	X	
		2	87.83	402	-314.17	X	X	X	X	
		3	87.83	352	-264.17	X		X	X	
		4	87.83	307	-219.17	X	X	X	X	
		5	87.83	287	-199.17	X		X	X	
		6	87.83	247	-159.17	X		X	X	
		7	87.83	187	-99.17	X	X	X	X	
		8	87.83	147	-59.17			X	X	
		9	87.83	102	-14.17			X	X	
		10	87.83	47	40.83				X	
Multiport Well	SVP-11	1	80.32	482	-401.68			X	X	
		2	80.32	402	-321.68			X	X	
		3	80.32	352	-271.68			X	X	
		4	80.32	307	-226.68			X	X	
		5	80.32	287	-206.68			X	X	
		6	80.32	247	-166.68			X	X	
		7	80.32	187	-106.68			X	X	
		8	80.32	147	-66.68			X	X	
		9	80.32	102	-21.68			X	X	
		10	80.32	47	33.32	X	X	X	X	
Regular Monitoring Wells	GWX-10019		85.52	-137.48 to -142.48		X	X	X		X
	GWX-10020		81.66	-103.34 to -108.34				X		X
	MW-01S			-50		X		X		X
	MW-01I			-225		X		X		X
	MW-02S			-50						X
	MW-02I			-225						X
	MW-03S			-50						X
	MW-03I			-225						X
	EW-1S			-125 to -185						X
	EW-1I			-195 to -255						X
	EW-1D			-265 to -325						X
Multiport Wells	SVP-01	1	86.58	450	-363.42					
		2	86.58	403	-316.42					
		3	86.58	373	-286.42					
		4	86.58	318	-231.42					
		5	86.58	293	-206.42					
		6	86.58	253	-166.42					
		7	86.58	203	-116.42					
		8	86.58	153	-66.42					
		9	86.58	103	-16.42					
		10	86.58	53	33.58			See note 1	See note 1	
	SVP-06	1	60.88	447	-386.12					
		2	60.88	370	-309.12					
		3	60.88	250	-189.12					
		4	60.88	180	-119.12					
		5	60.88	105	-44.12					
		6	60.88	50	10.88			See note 1	See note 1	

Table 2-3
Groundwater Monitoring Program
Old Roosevelt Field Contaminated Groundwater Area Site
Garden City, New York

Well Type	Well ID	Port	Ground Surface Elevation (feet amsl)	Sample Port Depth (feet BTOC)	Port Elevation (feet amsl)	Quarterly Monitoring (Q1,Q2,Q3) For VOCs	Quarterly Monitoring For Fe &Mn	Annual Monitoring (Baseline & Annual) For VOCs	Synoptic Water Level Quarterly	Synoptic Water Level Continuous
Multiport Wells	**SVP-07**	1	82.58	445	-362.42					
		2	82.58	428	-345.42					
		3	82.58	315	-232.42					
		4	82.58	208	-125.42					
		5	82.58	103	-20.42					
		6	82.58	48	34.58			See note 1	See note 1	
	SVP-08	1	62.26	435	-372.74					
		2	62.26	373	-310.74					
		3	62.26	238	-175.74					
		4	62.26	158	-95.74					
		5	62.26	103	-40.74					
		6	62.26	48	14.26			See note 1	See note 1	
	SVP-12	1	76.2	515	-438.8					
		2	76.2	485	-408.8					
		3	76.2	405	-328.8					
		4	76.2	355	-278.8					
		5	76.2	295	-218.8					
		6	76.2	245	-168.8			See note 1	See note 1	
	SVP-13	1	74.06	515	-440.94					
		2	74.06	485	-410.94					
		3	74.06	405	-330.94					
		4	74.06	355	-280.94					
		5	74.06	295	-220.94					
		6	74.06	245	-170.94			See note 1	See note 1	

Notes:
1. Sample and port pressure will be collected duirng the baseline sampling event and every five years afterward.

no sample collection at these ports or wells

amsl - above mean sea level
atm. - atmospheric
BTOC - below top of casing
Fe - iron
Mn - manganese
VOC - volatile organic compounds

Figures

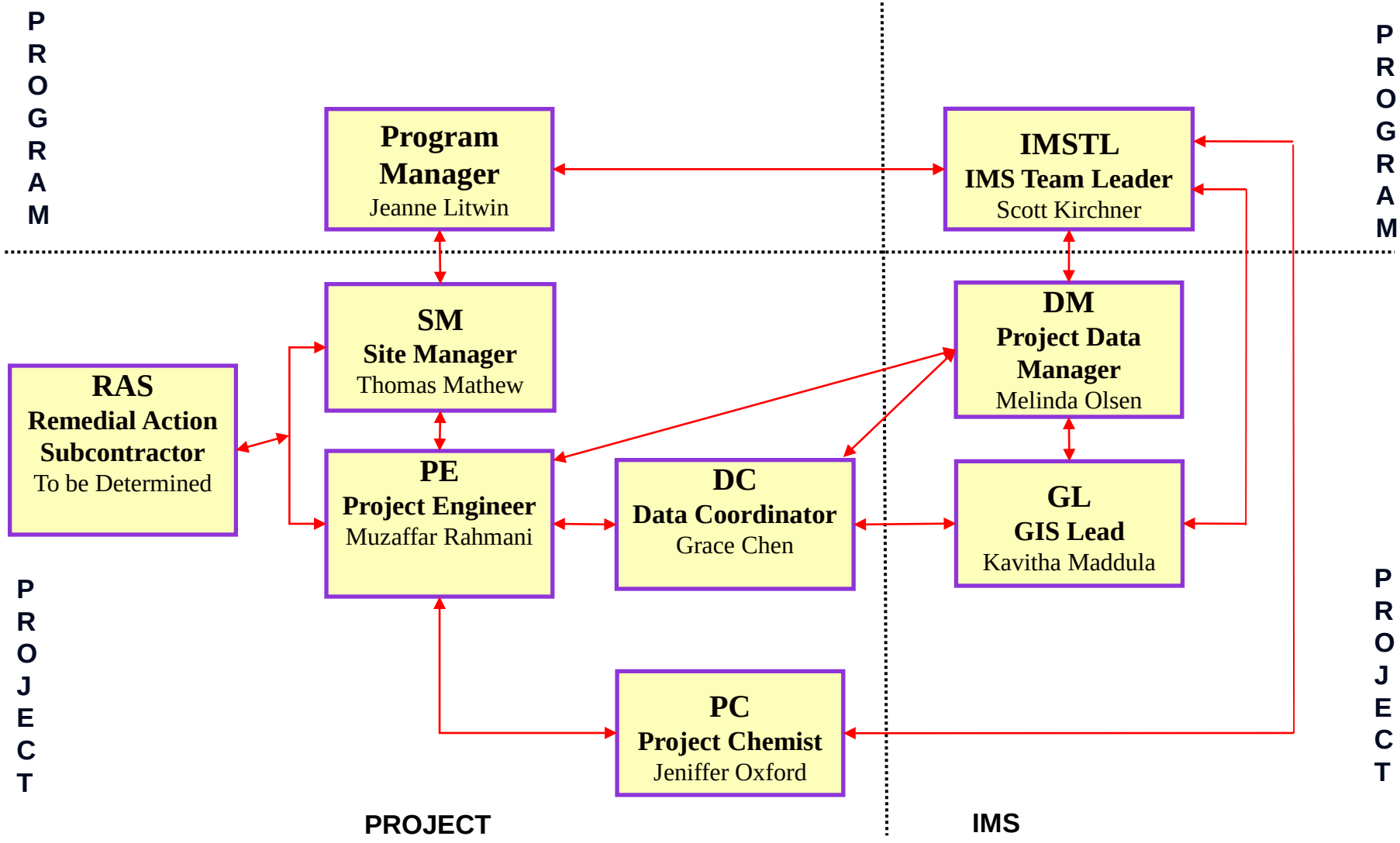


Figure 3-1
IMS / Project Team Communications Diagram
Data Management Plan
Old Roosevelt Field Contaminated Groundwater Area Site
Garden City, New York

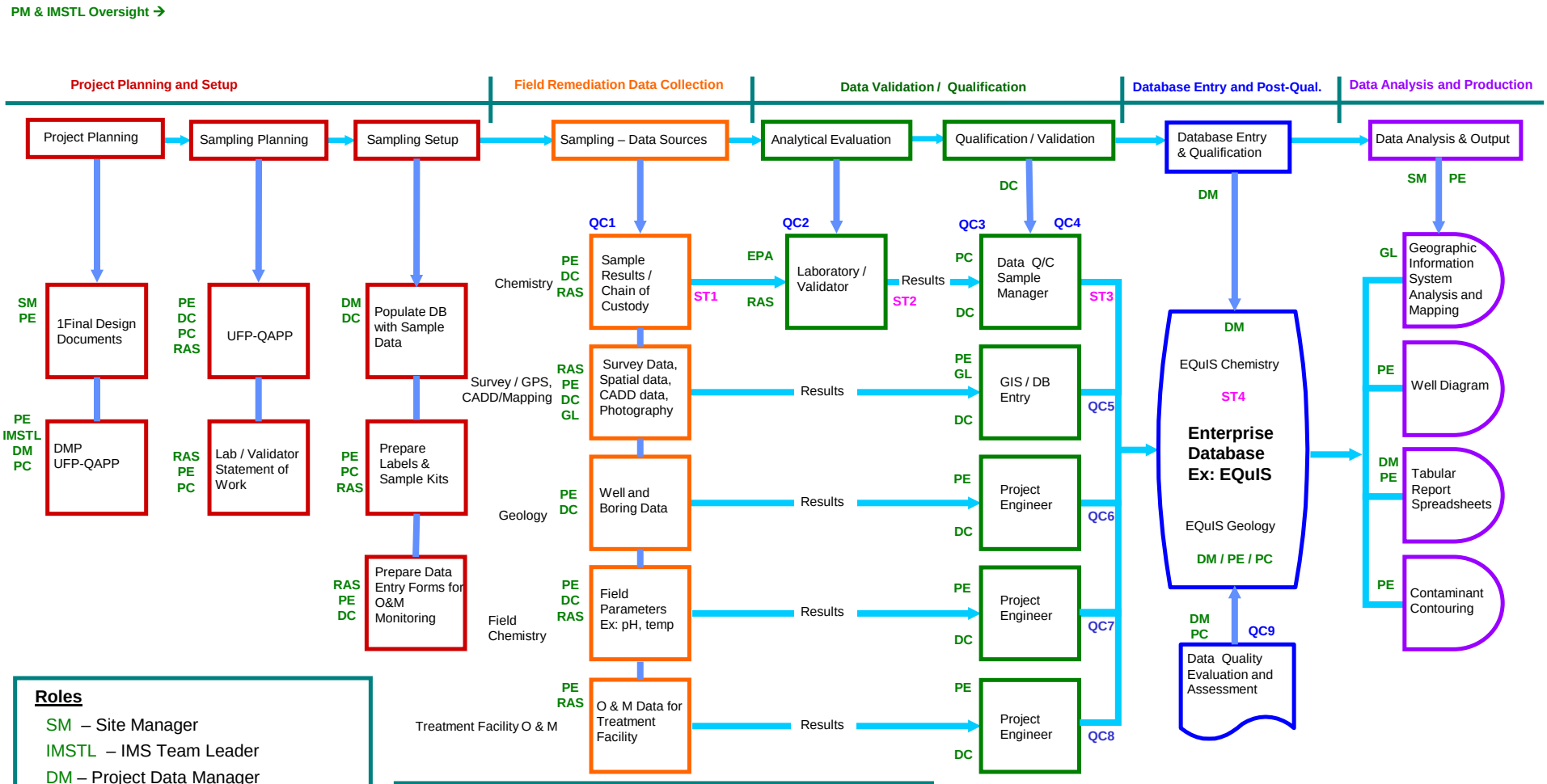


Figure 4-1
Data Flow Process Diagram
Data Management Plan
Old Roosevelt Field Contaminated Groundwater Area Site, Garden City, New York